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Welch Allyn®
Kreativ®

Mach 4.0
Micro Air Abrasion System
Service Manual

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Manufactured by

Kreativ, Inc. (USA)
9025 Balboa Avenue
San Diego, CA 92123

European Regulatory Manager

Welch Allyn LTD.
Navan, Co. Meath
Republic of Ireland
Ph: 353-46-79060

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1. Introduction

1.1 General

This manual contains information on the operation, maintenance, and service of the Kreativ Mach 4.0 Air Abrasion System. For more information on the operation and use of the Mach 4.0, the Operations Manual should be referenced.

The Mach 4.0 is designed for simple, reliable, and efficient operation with minimal maintenance. The system has been designed so that if a problem does arise. Troubleshooting and repair is normally simple and quick. Reviewing the information in this manual and using it as a reference will help in diagnosing and resolving any problems that may occur.

1.2 System Specifications

Power Requirements	100-127 VAC, 60Hz 220-240 VAC, 50Hz
Air Requirements	80 psi minimum-125 psi maximum @ 1.5 cfm (550-830 KPa @ 42.5 ltr./min.)
Approximate Size	13”W x 11”D x 11”H (33 cm W x 28 cm D x 28 cm H)
Approximate Weight	44 lb. (20 kg)
Environment Limitations	Temperature +50° F to 104° F (10° C to 40° C) Humidity 30% to 75%

1.3 Air Source options

There are three options available to supply the Mach 4.0 with the required air pressure. The system will operate effectively at input pressures of a minimum of 80 psi to a maximum of 120 psi from a clean, dry source. The air source options are as follows:

1.3.1 Main Office Compressor

The main office compressor system will normally be able to supply sufficient air pressure to operate the Mach 4.0 system. A dryer system should be in line with the compressor to ensure a clean, dry air supply. The air supply line to the Mach 4.0 should be connected to the main air line between the dryer system and the operatory regulator to get the full air pressure available from the compressor system.

1.3.2 Compact Compressor System

The Mach 4.0 can be operated off an auxiliary compact compressor system such as the optional JUN AIR system available from Kreativ. If an alternative compressor is used, sufficient filters and/or dyer system must be in line to prevent moisture or oil in the air source from clogging of the Mach 4.0

1.3.3 Compressed Nitrogen

Compressed nitrogen can be used to supply the Mach 4.0 system. There are various size tanks available from most local gas supply companies. The regulator used should be set to supply no more than 125 psi to the Mach 4.

2. Theory of Operation

2.1 Control Panel

2.1.1 Power Switch & Indicator LED

The Power Switch is the main ON/OFF switch for the system. In the OFF position all power to the unit is disabled and no indicators are lit. In the ON position electrical power is supplied to the Electronics Assembly enabling system operation. The Power Indicator LED will be illuminated green when the Power Switch is in the ON position and will not be lit in the OFF position.

2.1.2 Status Indicator LED

Status Indicator LED is driven by the Pinch Valve Status circuit. The Indicator LED will be green when the main (top) pinch valve tubing is in proper working condition. If the pinch valve tubing ruptures or is leaking the Status Indicator LED will flash red and an alarm will sound when the footswitch is depressed indicating that the pinch valve tubing needs to be replaced.

2.1.3 Pulse Mode Switch & Indicator LED

The Pulse Mode Switch allows the user to select either continuous or auto-pulse mode operation when the Footswitch is depressed. The Pulse Mode Indicator LED will be amber when in continuous mode and green when in pulse mode.

2.1.4 Air Switch & Indicator LED

The Air Switch controls the main air solenoid to pressurize or depressurize the pneumatic system. In the OFF position, the main air solenoid is disabled (open) keeping the pneumatic system depressurized and turning the indicator LED amber. In the ON position, the Main Air Solenoid is enabled (closed), pressurizing the pneumatic system and turning the indicator LED green.

2.1.5 Beam Intensity Control

The Beam Intensity control is used to control the amount or intensity of abrasive powder in the air stream affecting the cutting speed. The control is a rheostat which controls the intensity of the vibrator action on the Powder Chamber. On the scale of “0” to “10”, “0” is little or no powder and “10” is the maximum. Normal operation is usually between “3” and “7” depending on the user’s technique and the cavity preparation being done.

2.1.6 Particle Energy Control

The Particle Energy Control is a pressure regulator which adjusts the air pressure to the handpiece which controls the energy at which the abrasive particles hit the tooth surface. The air pressure setting is displayed on the Pressure Gauge. The air pressure can be set anywhere from 30 psi to 120 psi with the average range being between 65 psi and 95 psi.

2.2 Footswitch

The Mach 4.0 Footswitch is a two-position, ON and OFF, low voltage electrical switch. The Footswitch signal drives the circuitry on the Control Electronics PVB for the vibrator and Main and Quick Dump Pinch Valve solenoids.

2.3 Handpiece/Nozzles

The handpiece and nozzles for the Mach 4.0 are detachable and autoclavable in any standard dental autoclave.

Note: It is important to allow time for the handpiece and nozzles to completely dry after sterilization to prevent clogging due to residual moisture.

2.4 Front Access Door

2.4.1 Coalescing Filter

The Coalescing Filter is designed to filter out small amounts of moisture and/or oil remaining in the incoming air supply. It has an auto-dump valve so that each time the system is turned off any moisture collected will be automatically expelled.

Note: The coalescing filter is not designed to remove large amounts of moisture and/or oil from the air supply which must be accomplished with filters and dryers associated with the compressed air source.

2.4.2 Exhaust Bottle

The Exhaust Bottle provides a controllable location to exhaust powder/air mixture during the use of the Mach 4.0. The input to the Exhaust Bottle is connected to the Bleed-Off Pinch Valve and Quick Dump Pinch Valve. The air/powder mixture from either pinch valve is exhausted into the bottle where the powder is filtered out and contained and the air pressure released through the output port. The Exhaust Bottle should be checked at least weekly and emptied when it is three quarters full.

2.4.3 Pinch Valve Assemblies

1. The **Main Pinch Valve** controls the powder/air mixture flow to the handpiece. Pressurized air, controlled by the Main Pinch Valve Air Solenoid on the Pneumatic module, enters the base of the pinch valve, pressurizing the piston chamber, forcing the piston and shoe to pinch the tubing closed, thus blocking the air/powder flow to the handpiece.

   When the Footswitch is depressed, the air pressure to the Main Pinch Valve is shut off via the Main Pinch Valve Air Solenoid. The piston retracts opening the pinch valve tube allowing the powder/air to flow to the handpiece. When the Footswitch is released, the Main Pinch Valve is again pressurized and the piston closes or “pinches” the pinch valve tubing closed.

2. The **Quick Dump Pinch Valve** provides an instant release of pressure from the abrasive/air line to the handpiece. This allows the flow of abrasive powder from the nozzle to stop immediately when the Footswitch is released.

   When the Footswitch is depressed, the Quick Dump Pinch Valve is pressurized, closing or pinching the pinch valve tube and forcing the powder/air stream to flow through the handpiece/nozzle. When the Footswitch is released, the pressure to the Quick Dump Pinch Valve

is shut off, causing the valve to open. This allows the pressure in the handpiece line to exhaust immediately into the Exhaust Bottle, resulting in the output from the handpiece/nozzle to be cut off quickly with the release of the Footswitch.

3. The **Bleed-Off Pinch Valve** is used to depressurize the system when the Main Power Switch is turned to the OFF position or the Air Switch is in the STANDBY position. It is necessary to depressurize the pneumatic system when changing or adding abrasive to the powder chamber, when changing pinch valve tubing, or when working on the pneumatic system itself.

   When the Power Switch is in the OFF position or the Air Switch is in the STANDBY position, the Bleed-Off Pinch Valve is depressurized, opening the pinch valve tube allowing the pressure in the pneumatic system to bleed off through the pinch valve tube into the Exhaust Bottle.

   When the Power Switch is in the ON position or the Air Switch is in the ENABLE position, the Bleed-Off Pinch Valve is pressurized, closing or "pinching" the pinch valve tube, allowing the system to pressurize.

2.5 Rear Access Cover

2.5.1 Powder Chamber

The Powder Chamber is where the abrasive powder is added and stored and is mounted on the Vibrator Assembly. The Powder Chamber has three parts: (1) the powder chamber where the abrasive is added; (2) the orifice plate at the bottom of the powder chamber, which allows the abrasive to feed into the mixing chamber; and (3) the Mixing Chamber below the orifice plate where the abrasive is mixed with the main air stream before going to the handpiece. The input air supply to the Powder Chamber is from the Beam Intensity control (pressure regulator) on the Control Panel, and the output is connected to the handpiece via the Main Pinch Valve Assembly.

The Powder Chamber is pressurized when the Power Switch is ON and when the Air Enable Switch is in the ON position. Air will not flow through the Mixing Chamber until the Footswitch is depressed. Depression of the Footswitch opens the Main Pinch Valve, allowing the air/abrasive to flow to the handpiece. Also, when the Footswitch is depressed, the Vibrator assembly is activated, vibrating the Powder Chamber and causing the abrasive powder to feed through the Orifice Plate into the mixing chamber where it is picked up by the main air stream.

2.5.2 Vibrator Assembly

The Beam Intensity control on the front panel is a rheostat which controls the intensity at which the Vibrator Assembly oscillates. The higher the setting on the Beam Intensity control, the stronger the vibrating intensity, and the higher the powder flow rate through the orifice plate into the mixing chamber and air stream.

One lead of the vibrator coil is connected to Neutral, the other is in series with the Beam Intensity control rheostat and a rectifying diode. When the Footswitch is depressed, the circuit is enclosed, and the rectifier passes half of each AC input cycle and blocks the other half, resulting in the magnetic coil turning on and off at the rate of 60 cycles per second (50 cycles per second in 50Hz units). This turning off and on of the vibrator coil creates a vibrating motion which is imparted onto the Powder Chamber. The setting of the Beam Intensity control adjusts the amplitude of the signal to Vibrator Assembly; the higher the setting, the higher the vibrating amplitude, the more powder flow.

Note: Each Vibrator Assembly is factory adjusted to produce the proper vibrating characteristics. If the Vibrator does not function properly, it must be replaced or returned to the factory for readjustment or repair.

2.5.3 Powder Chamber Unload Switch

Depressing the Powder Chamber Unload Switch enables the Vibrator Assembly to assist in emptying the Powder Chamber. When the Powder Chamber is tilted over to the unload position, depressing the Unload Switch activates the Vibrator, causing the abrasive powder to flow smoothly and quickly out of the chamber.

2.5.4 Rear Access Panel Interlock Switch

The Rear Access Panel Interlock Switch disables the Main Air Solenoid when the rear access panel is open. The purpose for this interlock is to prevent air pressure from being applied accidentally to the Powder Chamber while the chamber lit is off during loading or unloading.

2.6 Control Modules

2.6.1 Pneumatic Module

The flow of the pressurized air through the system is controlled by solenoids on the Pneumatic Module. Signals from the Front Panel switches, Footswitch, and Control Electronics Module open and close the electronic solenoids to control the air flow throughout the system.

The main components of the Pneumatics Assembly are as follows:

1. **Pressure Relief Valve:** The Pressure Relief Valve is in line with the incoming air supply to protect the pneumatic system from excessive pressures. The Pressure Relief Valve is set to open if the incoming air pressure exceeds 140 psi and will automatically reset when the pressure drops below 140 psi.

2. **Main ON/OFF Switch:** The Main Air Solenoid is in the air supply line after the Pressure Relief Valve. It is energized (opened) to pressurize the system when the Power and Air switches are in the ON position and the rear access door is closed.

3. **Pinch Valve Detector Switch:** The Pinch Valve Detector Switch is connected to the Main Pinch Valve Solenoid assembly. It is calibrated to detect a difference in air pressure around the pinch valve tubing when it ruptures. The Status Indicator LED on the Control Panel is connected to the output of the detector switch. When the Footswitch is depressed and a ruptured pinch valve is detected, the Status Indicator LED will flash red and an alarm will sound.

4. **Main Pinch Valve Solenoid:** The Main Pinch Valve Solenoid controls the pressurized air supply, opening and closing the Quick Dump Pinch Valve. The drive signal is received from the Control Electronics PCB, reflecting the Footswitch position. The solenoid controls the pinch valve so that it is open when the Footswitch is not depressed and closed when the Footswitch is depressed. The Quick Dump Pinch Valve does not cycle in Pulse Mode.

5. **Pinch Valve Regulator:** The Pinch Valve Regulator is used to set the operating air pressure to the solenoids which drive the Main Pinch Valve, the Quick Dump Pinch Valve, and the Bleed-Off Pinch Valve. The regulator is adjusted in the factory during the final test and should not need adjustment in the field (unless done by a trained technician). If the regulator is adjusted incorrectly, it can cause the pinch valves to not close completely,

allowing continuous air flow from the handpiece or causing premature failure of the pinch valve tubing in one or more of the pinch valve assemblies.

6. **Pneumatic Manifold:** The Pneumatic Manifold provides a distribution point for air pressure throughout the pneumatic system.

2.6.2 Control Electronics Module

The Control Electronics Module controls the operation of the Mach 4.0 by detecting the positions of function switches (1) on the control panel, (2) in the Pneumatic Module, and (3) of the Footswitch position. The following is a list of the components and circuits on the Electronics PCB.

1. Electrical input to **Transformer T1** is 110 VAC (or 220 VAC) from the electrical source via the Power Switch on the Front Panel. The output of T1 is 12 VDC which is regulated to 5 VDC by the regulator U11 to operate the digital logic circuits.

2. **Solid state relay SSR1** is used to enable the Vibrator Assembly when either the Powder Chamber Unload Switch or the Footswitch is depressed.

3. **U6 (LLM556)** and the related circuitry provide the timing signals for the Pulse Mode option. When Pulse Mode is selected and the Footswitch is depressed, the timer is enabled, alternating the drive signal to the Main Pinch Valve Solenoid and Vibrator.

4. **U8 (LM555)** drives the Status Indicator on the Font Panel which indicates the status of the Main Pinch Valve tubing. When the Footswitch is depressed and a ruptured pinch valve tubing is detected, the Status Indicator LED will flash red and an alarm will sound.

5. **U7 (4N35)** and associated circuitry detect the position of the Footswitch and control the signals to the pinch valve solenoids and vibrator.

Connectors

J1: (input) Powder Chamber Dump Switch
J2: (input) Footswitch
J3: (input) Continuous/Pulse Mode Switch
J4: (input) Rear Access Panel Interlock Switch
J5: (input) Air Control Switch
J6: (output) Pinch Valve Detector/Status Indicator
J7: (input) Air Pressure Detector Switch
J8: (output) Main Air Supply Solenoid
J9: (output) Quick Dump Pinch Valve Solenoid
J10: (output) Main Pinch Valve
J11: (input) Electrical Supply Input
J12: (input) Beam Intensity control (Rheostat)
J13: (output) Vibrator Assembly
J14: (output) Front Panel LED PCB Assembly

3. Maintenance

3.1 General Maintenance

The Mach 4.0 system is designed for reliable operation with a minimum of maintenance. With periodic inspection and maintenance, the Mach 4.0 will continue to perform at optimum efficiency with limited problems or down time.

The Mach 4.0 should be inspected periodically for the following points:

1. Abrasive powder in the front or rear access areas. Powder in these areas can indicate a ruptured pinch valve tube, a loose or damaged hose, or spilled powder during filling. Any powder in these areas should be removed using a vacuum, brush, and/or a low-pressure air source. The source of the powder should be determined and corrected to maintain optimum system performance.
2. The covers on the Mach 4.0 can be cleaned with a cloth moistened with a mild detergent-based solution.
3. Damaged lids, covers, and accessories.
4. Worn, loose, or damaged wires or hoses.
5. Inoperative Indicator LEDs.
6. Proper operation of controls and gauges.
7. Worn or clogged nozzles and/or handpieces.

3.2 Powder Chamber

3.2.1 Filling the Powder Chamber

Complete the following procedure to fill the abrasive powder chamber:

1. Switch the Air Enable switch to the STANDBY position. (The Indicator LED should be amber.)
2. Open the Rear Access Panel by releasing the two side latches.
3. Remove the lid from the Powder Chamber by turning it counter clockwise.
4. Using a funnel, fill the Powder Chamber 2/3 to 3/4 full with the selected abrasive size. **Note: Over filling the Powder Chamber will cause excessive and/or erratic powder flow from the handpiece.**

5. Install the lid on the Powder Chamber and hand tighten. **Note: Check the Powder Chamber lid and the rubber gasket for damage. Nicks or excessive powder on the lid and gasket will cause the lid to leak air**.

3.2.2 Emptying the Powder Chamber

Complete the following procedure to empty the Powder Chamber:

1. Switch the Air Enable switch to the STANDBY position. (The Indicator LED should be amber.)
2. Open the Rear Access Panel by releasing the two side latches.
3. Remove the lid from the Powder Chamber by turning it counter clockwise.
4. Loosen the locking knob at the base of the Powder Chamber and slide the locking bar back.
5. Place a container or bowl next to the system, and tip the Powder Chamber over to allow the powder to flow out.
6. Set the Beam Intensity control to "10".
7. Depress the Unload Switch to force powder to flow out quickly and completely.
8. Tilt the Powder Chamber back to its upright position, and lock it in place with the locking knob.
9. Use a vacuum and brush to remove any powder remaining in the chamber.

3.2.3 Cleaning the Powder Chamber

If the air source contains moisture or oil, clogging or clumping of the powder may occur in the Powder Chamber and/or mixing chamber. Complete the following steps to clear the Powder Chamber and mixing chamber:

1. Empty the Powder Chamber by the procedure listed in section 3.2.2.
2. Use a vacuum and brush to remove any powder remaining in the chamber.
3. Clear the orifice plate and mixing chamber as follows:
    - Turn the Power Switch ON.
    - Turn the Air Enable Switch ON (toggled to the right).
    - Hold the vacuum hose at the top of the Powder Chamber.
    - Briefly depress the Rear Cover Interlock switch. (This will force air upward through the orifice plate and mixing chamber.)
4. Visually verify that all the orifice holes at the bottom of the Powder Chamber are clear and open.
5. If one or more of the orifice holes are still blocked, use a small endo file or small wire to open them and repeat "step c".
6. Install the Powder Chamber lid and close the rear cover.

7. Remove the nozzle of the handpiece and point the end of the handpiece into the vacuum system.

8. Depress the Footswitch for 15 to 20 seconds. This will allow maximum air flow through the system to clear any excess abrasive that may be stuck in the lines.

9. Fill the Powder Chamber as described in section 4.2.1.

3.3 Pinch Valve Assemblies

The rubber pinch valve tube in each of the 3 pinch valve assemblies wears and will require periodical replacement. Spare pinch valve tubes are shipped with each system. The Status Indicator on the front panel will flash red, and an alarm will sound when the Footswitch is depressed if the main (top) pinch valve has ruptured during a procedure. The pinch valve tubing is easily and quickly replaced as follows:

Note: Kreativ suggests that the main (top) pinch valve tubing be replaced each time the Powder Chamber is refilled. This will greatly reduce the possibility of a pinch valve rupturing during a procedure.

1. Set the Power Switch to the OFF position and verify the air pressure drops to 0 on the pressure gauge. Allow an additional 5 to 10 seconds after the gauge reading reaches 0 to ensure the system has completely depressurized.

2. Remove the top block from the pinch valve assembly by removing the two knurled screws.

3. Remove the worn pinch valve tube from the fittings, and carefully insert a new pinch valve tube onto the fittings.

4. Insert the new pinch valve tubing and fittings into the bottom block indentations.

5. Carefully replace the top block, making sure that the tube and fittings align with the indentations in the top block. Secure the top block in place with the knurled screws.

6. Turn the Power Switch to ON. Press the Footswitch several times and check for proper operation without air/powder leaks from the pinch valve assembly.

3.3.1 Pinch Valve Regulator

Note: The Pinch Valve Regulator is adjusted and set during the final test procedure at the factory and normally will not need to be adjusted in the field.

The indication that the Pinch Valve Regulator needs adjustment is a light and continuous air/powder flow from the nozzle when the Footswitch is released. This means that there is not enough pressure on the pinch valve tubing to completely close or pinch off the air/powder flow. Complete the following procedure to set the Pinch Valve Regulator:

1. Remove the top access panel, and locate the Pinch Valve Regulator on the Pneumatics Module.

2. Switch the Power and Air Enable Switches to the ON positions.

3. Pull the regulator adjustment knob up to unlock it.

4. Depress and release the Footswitch.

5. Verify that there is a light, continuous flow of air from the nozzle.

6. Slowly turn the regulator adjustment knob clockwise until air flow from the nozzle stops completely.

7. Turn the regulator adjustment knob one full turn clockwise past the point in Step 6.

8. Push the adjustment knob down to the locked position.

9. Re-install the top access panel.

3.4 Exhaust Bottle

The Exhaust Bottle collects small amounts of powder each time the Footswitch is released or the unit is turned off and will require periodical emptying. As use of the unit will determine how quickly it fills, it should be checked and emptied as part of a weekly system check.

To empty the Exhaust Bottle:

1. Switch the Power Switch to the OFF position.

2. Slide the Exhaust Bottle out of the unit.

3. Using a counter clockwise motion, unscrew the collection bowl from the top assembly.

4. Carefully pull down on the collection bowl to separate it from the top.

5. Dispose of the abrasive powder in the collection bowl**. DO NOT REUSE THE POWDER IN THE COLLECTION BOWL.**

6. Vacuum the remaining powder from the collection bowl and filter assembly.

7. Reinstall the collection bowl by pushing it carefully over the filter and screwing it back onto the top assembly. Hand tighten only. **Note: The collection bowl may be difficult to reinstall if excessive powder is on the threads of the bowl. Use a slightly damp cloth to clean any powder from the threads. This should allow for easier reinstallation of the collection bowl.**

3.5 Handpieces and Nozzles

The handpiece and nozzles for the Mach 4.0 can be sterilized by any standard dental autoclave or sterilization method. After removal from the autoclave, the handpiece and nozzles should be allowed time to completely dry before use, as moisture from the autoclave will cause clogging in the handpiece and/or nozzle.

The nozzles will wear after a period of time and require replacement. The time before replacement is needed will depend on the daily use of the system. Indications that the nozzle is worn are that the cutting efficiency is slow and that the particle beam out of the nozzle is undefined.

4. Troubleshooting

PROBLEM	PROBABLE CAUSE	REMEDY
Unit does not turn ON.	Instrument not plugged in	Check Plug
	Main Power Switch Off	Check Switch
	Blown Fuse	Call Service. Rep.
No air/powder flow when Footswitch is depressed	Footswitch not plugged in	Check connection
	Powder flow not selected	Check gauge
	Handpiece/nozzle clogged	Check for clog
	Tubing pinched	Check tubing
	Air Valve problem	Call Service Rep.
	Mixing Chamber Empty	Refill powder Chamber with Abrasive Powder
	Air Enable Switch OFF	Turn Air Switch ON
	Clogged orifice in Chamber`	Clear Orifice holes (Disassemble & clean chamber)
Air flow from nozzle when Footswitch is not depressed	Pinch Valve Regulator out of adjustment	Call Service Rep.
	Ruptured Pinch Valve	Check Pinch Valve
Erratic powder flow	Powder caking in Chamber	Replace powder
	Chamber empty	Check powder level
	Nozzle partially clogged	Check nozzle
	Vibrator inoperative	Call Servoce Rep.
	Moisture in air line	Check filters
Powder spray loses definition	Worn nozzle tip	Replace nozzle

5. Separate Parts List

Air Supply Hose, 10' w/ quick-disconnects	K01-00056-001
Handpiece Tip	3410-1
Fuse, 1 amp	500-005-21
Black Tubing, 8'	550-037-5
Pinch Valve Tubing (8)	3455-1
Nozzle .011”/.28 mm @ 45 degrees	3744-1
Nozzle .011”/.28 mm @ 90 degrees	3591-1
Nozzle .014”/.36 mm @ 45 degrees	4329-1
Nozzle .014”/.36 mm @ 90 degrees	4328-1
Nozzle .018”/.46 mm @ 45 degrees	3584-1
Nozzle .018”/.46 mm @ 90 degrees	3592-1
Nozzle .026”/.66 mm @ 45 degrees	3585-1
Nozzle .032”/.81 mm @ 45 degrees	3586-1
Powder, 50 Micron (4 lbs)	K99-00003-003
Powder, 27.5 Micron (4 lbs)	K99-00003-002
Power Cord (110vac)	K99-00024-001
Power Cord (220vac)	K99-00009-001
Powder Funnel	550-084-2
Quick-Connect Fitting (male)	K99-00065-001
Quick-Connect Fitting (female)	K99-00068-001
Pressure Gauge	K99-00153-1

6. Tool List

6.1 Basic Tool List

CAUTION: The list of tools named below is for reference only. Repair or service of the Kreativ air abrasion system should only be done by authorization from Kreativ or a trained Kreativ representative.

Screwdrivers	straight-small or medium
	phillips-small or medium
Allen Wrenches	3/32”, 3/16”, 5/64”, 5/32”
Open Box Wrenches	7/16’, 3/8”, 1/4”
Crescent Wrench	medium, (4”)
Diagonal Cutters	medium
Pliers	
Exacto Knife (sharp knife)	
Small Brush	

7. Schematics and Diagrams